

THE CURRENT STATE AND PROBLEMS OF MULTIMODAL RADIATION DIAGNOSIS OF PNEUMONIA WITH THE ASSOCIATION OF CORONAVIRUS INFECTION

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Annotation: Coronavirus infection (COVID-19) is an acute infectious disease caused by a new strain of SARS CoV—2 coronavirus with an aerosol-drip and contact-household transmission mechanism. Pathogenetically COVID-19 is characterized by viremia, local and systemic immuno-inflammatory process, hyperactivity of the coagulation cascade, endotheliopathy, hypoxia, which leads to the development of micro- and macrothrombosis; it proceeds from asymptomatic to clinically pronounced forms with intoxication, fever, vascular endothelium damage, lungs, heart, kidneys, gastrointestinal tract, central and peripheral nervous systems with the risk of complications (ODN, ARDS, PE, sepsis, shock, SPON). The main target of SARS CoV-2 is the lungs. In pathogenesis, 2 mechanisms should be distinguished that mutually burden each other and can lead to the development of ARDS (pathomorphologically diffuse alveolar damage): direct viral damage of alveocytes with the development of immuno-inflammatory syndrome; development of micro- and macrothrombosis of pulmonary vessels and obstructive thromboinflammatory syndrome [1.3.5.7.9].

Key words: COVID-19, cascade, endotheliopathy, hypoxia, macrothrombosis, heart, kidneys.

Introduction

Therefore, the disease was named microCLOTS – microCOVID Lung Obstructive Trombovascular Syndrome¹. As in the whole world, the incidence of COVID 19 pneumonia in the Republic of Uzbekistan is more than 193,000 people, while there is a steady increase.² The severity and severity of the clinical manifestations of COVID-19 depends on the massiveness of infection (the infecting dose of the virus) on the one hand and the individual characteristics of the macroorganism on the other (age, gender, strength of the immune response, the presence of concomitant diseases-risk factors, etc.). In radiation diagnostics, various variants of changes in the lungs in patients with confirmed coronavirus pneumonia detected using various methods of medical imaging (computed tomography, magnetic resonance imaging, X-ray and ultrasound diagnostics) during primary radiation examination are considered. The existing ideas about the possibilities of various methods of radiation diagnostics, knowledge of terminology and understanding of the radiation picture allow doctors of clinical specialties to increase the effectiveness of using medical imaging in the examination of patients with coronavirus pneumonia. Computed tomography is generally considered to be the main method of assessing the lesion of the pulmonary parenchyma, but MRI also provides informative data on the presence of changes characteristic of coronavirus pneumonia, and can be used as an alternative. Magnetic resonance imaging allows you to visualize signs of possible development of respiratory distress syndrome, the addition of bacterial infection, and is also informative for identifying the consequences of pneumonia, which is necessary for the appointment of rehabilitation measures. Traditional radiographic examination for the correct interpretation of the results requires the appropriate qualification of a radiologist and his knowledge of the clinical picture of coronavirus pneumonia and should be supplemented with CT if COVID-19 is suspected. The use of an ultrasound diagnostic method is most appropriate for monitoring the condition and treatment of patients with severe coronavirus pneumonia in intensive care units and intensive care units, as well as in cases

where the patient's condition requires multiple evaluation of the pulmonary parenchyma during the day [2.4.6.8.9].

The aim of the study is to study the relationship between the results of chest CT and the clinical manifestations of COVID-19 pneumonia.

Objectives of the study:

to study changes in the lungs associated with coronavirus infection based on radiological criteria

to evaluate the stages and characteristics of the degree of changes in the lungs associated with coronavirus infection based on CT signs

optimize CT and X-ray methods in the presence of COVID 19 pneumonia in cases where the PCR test result is negative.

to determine the indications for the use of CT diagnostics for changes in the lungs associated with coronavirus infection.

The object of the study were 112 patients examined at the Bukhara Infectious Diseases Hospital.

The subject of the study was the results of radiography, and computed tomography, as well as PCR studies in patients with pneumonia associated with coronavirus infection.

Research methods. X-ray, computed tomography, laboratory and statistical methods of research were used in the performance of the work.

The analysis of literature sources devoted to the study of multimodal radiation diagnosis of pneumonia COVID 19 is carried out. The etiology and pathogenesis of the disease are also covered in detail, methods of radiation diagnostics and laboratory tests for COVID 19 pneumonia are also analyzed. This chapter demonstrates the variants of the radiation pattern of changes in the lungs in COVID-19 associated viral pneumonia when using different methods of medical imaging (CT, MRI, radiography and ultrasound).

Radiography was performed on a Shimadzu X-ray machine in standing, sitting and lying positions. We used a DR system based on a semiconductor flat-panel detector, which has the highest resolution. This X-ray machine has a high resolution, which is 3.1 pairs of lines per 1 mm (while the resolution of 2 pairs of lines per 1 mm is considered sufficient for lung examination). Contrast sensitivity is 1.0 (at a norm of 2).

The main one was a straight rear projection in supination laying. The patient stands in an upright position, a digital detector is placed against the back, combining the center of the detector with the central beam. The X-ray beam was directed perpendicular to the detector at the center of the chest (level Th7 of the vertebra), which approximately corresponds to the level of the nipples. We used the transverse arrangement of the detector, because this reduced the probability of cutting off the lateral fields and costal-diaphragmal sinuses. Its upper edge was located a few centimeters above the shoulders. The exposure was performed on the second full breath. The source/detector distance was 100-120 cm.

In order to protect against ionizing radiation, we performed diaphragming of the irradiation field. Limiting the radiation area reduces not only the dose received by the patient, but also the amount. Laying the patient during radiography in a straight back projection of scattered radiation, which, in turn, improves the image quality. At the same time, the whole organ should be determined on the X-ray. When examining the chest organs, all structures from the tops of the lungs to the level of the Th12-L1 vertebra, including pleural sinuses, were always visualized on the X-ray.

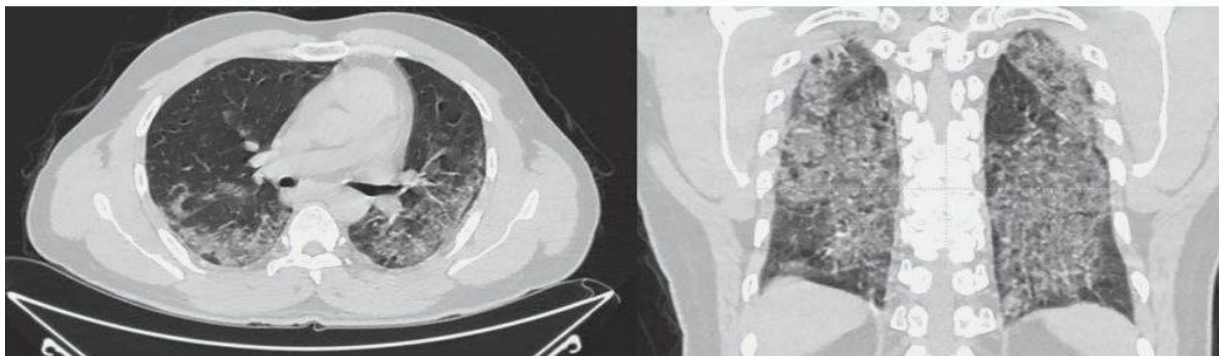


Fig. Patient M., 46 years old. CT of the lungs, "pulmonary window", axial and coronary planes. Areas of "frosted glass" with uneven and clear contours are defined along the periphery. PCR is positive.

Most often, the "frosted glass" was bilateral – in 87 (79.0%) patients, only subpleural lesions were detected in 23 (20.9%), but there were patients in whom CT examination only revealed areas of "frosted glass" of both peripheral 15 (13.6%) and central localization – 9 (8.2%). Among the typical manifestations of the "frosted glass" symptom, either drain foci were detected – in 74 (67.3%) cases, or rounded foci – in 36 (32.7%) cases.

In 16 (14.5%) cases, dorsal lesions were noted, in 94 (85.4%) – chaotic lesions of different segments, both peripheral and central localization.

According to the results of the analysis of data obtained during the study in patients with SARS CoV-2-pneumonia, it was demonstrated that MSCT is a highly sensitive method for diagnosing pathological changes in lung tissue. The CT semiotics of COVID-19 viral pneumonia described in the literature (numerous peripheral compaction of lung tissue by the type of "frosted glass", consolidation of lung tissue, reticular changes, thickening of the pleura, subpleural enlightenment (by the type of air bands), symptom of an air bronchogram, thickening of the interlobular interstitium by the type of "cobblestone pavement" (Eng. "crazy-paving" sign), "halo", the reverse "halo" was clearly traced in our patients.

The different prevalence and semiotics of COVID-19-associated pneumonia indicate a different body response to infection. The need to comply with certain methodological requirements during MSCT in patients with pneumonia caused by SARS-CoV-2 is emphasized. The effect of an air bronchogram against the background of consolidations in our patients has always been preserved. That is, the bronchi and bronchioles in COVID-19 are passable and are almost not involved in the process in the absence of bacterial infection [10.11].

As a result of the research of the dissertation of the Doctor of Philosophy (PhD) on the topic "The role of computed tomography in assessing the stage and complications of COVID 19 pneumonia", the following conclusions were formulated:

Radiography, being the basic method of diagnosing pneumonia with the association of coronavirus infection, has limited effectiveness, having a sensitivity of 87.1%, specificity of 76.7%, diagnostic accuracy of 84.0%.

The most typical CT signs of pneumonia associated with coronavirus infection are dilation and stagnation in the capillaries of the alveoli, fluid exudation into the alveolar cavity, swelling of the interlobular interstitium, which is displayed on the MSCT in the form of single or multiple changes in the type of "frosted glass", mesh seal of the interstitium, drain characteristic changes and the appearance of foci of high density on the background "frosted glass". CT sensitivity in the detection of breast cancer was 98.3%, specificity -96.3%, diagnostic accuracy – 95.0%.

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